

REFLECTIONS

Hilton Lewis, Deputy Director

I joined the Keck Observatory in 1986 as a young telescope engineer, in the days when it was all just paper – an incomplete set of ideas, designs and prototypes. In the intervening years I have been privileged to work as part of a small team of extraordinarily creative scientists and engineers as we turned those ideas into this marvelous facility. And I have been fortunate indeed to work with and lead some of the most skilled and dedicated people anywhere, as they breathed life into the machine and nurtured it into reality.

When I look back at over 25 years at the Keck Observatory, I am struck by how simple the fundamental ideas are that led to its prominence and yet how challenging it was to turn those ideas into the remarkable organization that is this great observatory today.

Keck started out with two very simple notions: make the world's largest aperture telescope using a hexagonally tiled primary mirror, and build it fast. Almost everything about Keck today flows from these two decisions. The segmented primary mirror is well known now and is the basis for the largest proposed telescopes on the ground and in space. At the time however, it represented a huge gamble, crucially dependent on new techniques for figuring the mirrors, measuring their relative positions and controlling them – something only made possible by the advent of low-cost computing in the 1980s.

The other innovation: build it fast and get it into the hands of astronomers quickly.



This principle required a razor sharp focus on what was truly essential, the resolve to get things done and the determination to keep costs under control. We had the funds, we had the ideas, we moved forward. Keck was designed and built in 7 years by a very small staff – and groundbreaking science immediately and continuously followed. Recognizing this success, the Keck Foundation immediately granted funds for the second telescope – a far-sighted move based on their faith in the team to deliver the goods.

Of course, this approach had its downside: systems were designed to meet the essentials of what they must do and no more; nice-to-have features were discarded along the way (for example, we have no mirror cover, long a standard on telescopes), and some systems were fully completed only after they were already in service. It may surprise you to learn that Keck is decidedly not a gold-plated machine, though we do use gold on our segment sensors!

The determination to build something of lasting value, quickly, with a small staff and to get a robust capability into the hands of the users defines the Keck Way. You won't see it written down anywhere, but our unofficial mission statement is "Get There First." We are impatient to get things done, and we strive to stay focused on what really matters. Our staff has a tremendous can-do attitude, and will go to extraordinary lengths whether to build some revolutionary new capability or to save a night's observing.

Delivering systems at Keck is all about smart engineering, and knowing when to say "enough." As one saying goes, "an engineer is someone who can do with a dollar what any damn fool can do with ten." In a world driven by rapid technological innovation, the perfectly engineered machine is obsolete before it is finished. On the flip side, delivering a lab experiment to the observatory would be a disaster: astronomers need to be able to do science with the telescope and its instruments – and doing science means being able to focus on astronomy, not debugging hardware and software. This balance between performance, reliability, usability and cost is incredibly fine tuned in a successful observatory. Get it wrong and you waste millions of dollars and years of effort. But get it right, and you will have built something transcendent, something that can unlock the

secrets of the cosmos. Sometimes we fail – that's the risk of pioneering - but more often we get it right.

There is one more facet to the Keck Way and that is the spirit of the people who work here. Building the machine is only one of the two vital parts; the other is to provide unsurpassed service to our astronomers in operating it. We treat every night as a priceless commodity. For although the stars will shine again tomorrow, tonight's astronomer may only get this one shot, and to her it is the most precious research instrument in the world. As an engineer I have had the opportunity and tremendous satisfaction of working on the hardest problems, side by side with the smartest people. But as a leader of the observatory, what I have valued most has been the chance to shape our entire team to foster this spirit and realize the vision that is Keck Observatory.

As I look forward to the next 25 years, I see a very different set of circumstances than those that confronted us at the start. Funding for science is under huge pressure now, and there are other new and exciting facilities planned for the next decade. But I am confident that Keck will continue to play a leading role in astronomy. Today we are the largest and most powerful set of telescopes; in a decade we will be the platform for innovation in adaptive optics and instrumentation, continuing our tradition of groundbreaking science. For the processes and people that make up the Keck Observatory will continue to provide something of lasting value to our community and to the world far into the future.

FACING PAGE: *The reflection of Optical Systems Scientist Olivier Martin is shown in the close up of the Keck I center launch telescope assembly he is working on to complete commissioning of this next generation LGS AO system.*

ABOVE: *Deputy Director Hilton Lewis celebrated multiple milestones in 2011. Not only did he reach his 25th anniversary as an employee of the Keck Observatory, he also completed his MBA at the Shidler College of Business, which recognized him as Outstanding MBA in Technology. At Keck, Lewis was the first to make the 25th year staff milestone.*

BELOW: *Keck Observatory's ace operations team take all the necessary precautions to safely handle transport of the Keck II secondary mirror, a vital component of the largest and most powerful set of telescopes on Earth.*

